

1. An apparatus for detecting user speech comprising:  
a first microphone and at least a second microphone each operable to generate sound signals with respective signal characteristics;  
the first microphone operable to capture a greater proportion of speech sounds of a user than the second microphone;  
5 processing circuitry operable to process the signal characteristics of the sound signals generated by the first microphone and the second microphone to determine variations in those signal characteristics for determining if the user is speaking.
2. The apparatus of claim 1 further comprising processing circuitry operable to process the first microphone sound signals.
3. The apparatus of claim 1 further comprising speech recognition circuitry operably coupled with the first microphone for selectively recognizing speech sounds detected by the first microphone.
4. The apparatus of claim 1 wherein the first microphone is located relative to the second microphone to capture a greater proportion of speech sounds of a user.
5. The apparatus of claim 1 further comprising a headset to be worn by a user and housing the first and second microphones.

6. The apparatus of claim 5 wherein the first microphone is positioned in the headset to be closer to a mouth of the user than the second microphone when the headset is worn.
7. The apparatus of claim 1 wherein the signal characteristics processed are sound signal levels.
8. The apparatus of claim 1 wherein the signal characteristics include at least one of energy level characteristics, frequency characteristics, amplitude characteristics and phase characteristics.
9. The apparatus of claim 1 further comprising processing circuitry operable for initially determining a variation between signal characteristics of the first and second sound signals when the user is not speaking and then using that variation as a baseline.
10. The apparatus of claim 9 wherein the processing circuitry is operable for determining if the signal characteristics variation exceeds the baseline variation by a predetermined amount to determine if the user is speaking.
11. The apparatus of claim 1 wherein the second microphone is an omnidirectional microphone.

12. The apparatus of claim 1 further comprising mel scale filters, the processing circuitry operable to use outputs of the mel scale filters for determining variations in the signal characteristics.

13. The apparatus of claim 1 further comprising circuitry for measuring energy levels of sound signals from the first and second microphones, the processing circuitry operable to use the measured energy levels for determining variations in the sound signal levels.

14. A terminal system for detecting user speech comprising:

a headset including first and second microphones operable to generate sound signals with respective signal characteristics, the first microphone operable to capture a greater proportion of speech sounds of a user wearing the headset than the second microphone;

a terminal including processing circuitry operable to process the signal characteristics of the first microphone signals and the signal characteristics of the second microphone to determine variations in those signal characteristics for determining if the user is speaking.

15. The terminal system of claim 14 further comprising processing circuitry operable to process the first microphone sound signals.

16. The terminal system of claim 14 the terminal further comprising speech recognition circuitry operably coupled with the first microphone for selectively recognizing speech sounds detected by the first microphone.

17. The terminal system of claim 14 wherein the first microphone is positioned in the headset to be closer to a mouth of the user than the second microphone when the headset is worn.

18. The terminal system of claim 14 wherein the signal characteristics processed are sound signal levels.

19. The terminal system of claim 14 wherein the signal characteristics include at least one of energy level characteristics, frequency characteristics, amplitude characteristics and phase characteristics.

20. The terminal system of claim 14 further comprising processing circuitry operable for initially determining a variation between signal characteristics of the first and second sound signals when the user is not speaking and then using that variation as a baseline for subsequent processing of other variations in the signal characteristics for both the first and second microphones.

21. The terminal system of claim 14 wherein the processing circuitry is operable for determining if the signal characteristics variation exceeds the baseline variation by a predetermined amount to determine if the user is speaking.

22. A headset for use with a terminal having speech recognition capabilities, the headset comprising:

5 a first microphone and a second microphone each operable to generate sound signals with respective signal characteristics, the first microphone operable to capture a greater proportion of speech sounds of a user than the second microphone; and

10 processing circuitry operable to process the signal characteristics of the sound signals generated by the first microphone and the second microphone to determine variations in those sound signal characteristics for determining if the user is speaking.

23. The headset of claim 22 further comprising processing circuitry operable to pass the first microphone sound signals to the terminal when it has been determined that the user is speaking.

24. The headset of claim 22 wherein the first microphone is located relative to the second microphone to capture a greater proportion of speech sounds of a user.

25. The headset of claim 22 wherein the signal characteristics processed are sound signal levels.

26. The headset of claim 22 wherein the signal characteristics include at least one of energy level characteristics, frequency characteristics, amplitude characteristics and phase characteristics.
27. The headset of claim 22 further comprising processing circuitry is operable for initially determining a variation between signal characteristics of the first and second sound signals when the user is not speaking and then using that variation as a baseline for subsequent comparison of other variations in the signal characteristics for both the first and second microphones.
28. The headset of claim 27 wherein the processing circuitry is operable for determining if the signal characteristics variation exceeds the baseline variation by a predetermined amount to determine if the user is speaking.
29. The headset of claim 22 further comprising mel scale filters, the processing circuitry operable to use outputs of the mel scale filters for determining variations in the signal characteristics.
30. The headset of claim 22 further comprising circuitry for measuring energy levels of the sound signals from the first and second microphones, the processing circuitry operable to use the measured energy levels for determining variations in the sound signal levels.

31. An apparatus in a voice-driven system for detecting user speech, comprising:

a plurality of microphones separated on the body of a user and developing a plurality of signals with signal characteristics, at least a first  
5 signal of said plurality of signals including a greater proportion of user speech than a second signal of said plurality of signals which is characterized predominantly by ambient sounds; and

processing circuitry configured to process said plurality of signals for determining variations in their signal characteristics to develop an output  
10 signal that reveals the presence or absence of user speech.

32. The apparatus of claim 31 wherein said processing circuitry generates a signal characteristic baseline from which said output signal is developed.

33. The apparatus of claim 32 wherein said baseline is stored in a memory.

34. The apparatus of claim 32 wherein said baseline represents a difference in signal level over a predetermined time base between said first and second signals.

35. The apparatus of claim 32 wherein said output signal is developed by summing said first signal with said baseline.



36. The apparatus of claim 31 comprising a first microphone positioned near the mouth of a user and configured to develop a first signal characterizing predominantly user speech, and a second microphone positioned away from the mouth of the user and configured to develop a second signal characterizing predominantly sounds other than user speech.

37. The apparatus of claim 31 wherein said signal characteristics comprises signal level.

38. The apparatus of claim 37 wherein said processing circuitry compares the signal levels of said plurality of signals.

39. The apparatus of claim 31 including speech processing circuitry configured to process said output signal only when user speech is present.

40. The apparatus of claim 39 wherein said speech processing circuitry is located in a central computer.

41. The apparatus of claim 39 wherein said speech processing circuitry is located in a body worn terminal.

42. The apparatus of claim 39 wherein said speech processing circuitry is located in a headset.

43. The apparatus of claim 36 wherein said first microphone is directional and said second microphone is omnidirectional.

44. A method for detecting user speech in a voice-driven environment, the method comprising:

detecting sound with first and second microphones to generate sound signals for the respective microphones;

5 locating the first microphone to detect a greater proportion of speech sounds of a user than the second microphone;

processing signal characteristics of the sound signals generated by the first microphone and the second microphone and based on the variations in those sound signal levels, determining if the user is speaking.

45. The method of claim 44 further comprising based on such a determination, further processing the first microphone sound signals.

46. The method of claim 44 further comprising using speech recognition for recognizing speech sounds detected by the first microphone.

47. The method of claim 44 further comprising positioning the microphones in a headset to be worn by a user.

48. The method of claim 44 wherein the signal characteristics include at least one of energy level characteristics, frequency characteristics, amplitude characteristics and phase characteristics.

49. The method of claim 44 further comprising:  
when the user is not speaking, determining a variation in the signal characteristics for both the sound signals of the first and second microphones and using that variation as a baseline.
50. The method of claim 49 further comprising subsequently comparing the variation in the signal characteristics for both the first and second microphones to the baseline variation for determining if the user is speaking.
51. The method of claim 50 further comprising determining if the signal characteristics variation exceeds the baseline variation by a predetermined amount to determine if the user is speaking.

52. A method useful in a voice-driven system for detecting user speech, comprising:

developing a plurality of sound signals with signal characteristics from spaced locations on the body of a user, at least a first signal of said plurality of signals including a greater proportion of user speech than a second signal of said plurality of signals which is characterized predominantly by ambient sounds other than user speech; and

processing said plurality of signals for determining variations in their signal characteristics to develop an output signal that reveals the presence or absence of user speech.

53. The method of claim 52 wherein said processing generates a signal characteristic baseline from which said output signal is developed.

54. The method of claim 53 wherein said baseline is stored in a memory.

55. The method of claim 53 wherein said baseline represents a difference in signal level over a predetermined time base between said first and second signals.

56. The method of claim 52 wherein said output signal is developed by summing said first signal with said baseline.

57. The method of claim 52 comprising positioning a first microphone near the mouth of a user to develop said first signal characterizing predominantly user speech, and positioning a second microphone away from the mouth of the user to develop said second signal characterizing predominantly sounds other than user speech.
58. The method of claim 52 wherein said signal characteristics comprises signal level.
59. The method of claim 58 wherein said processing circuitry compares the signal levels of said plurality of signals.
60. The method of claim 52 including performing speech processing on said output signal only when user speech is present.